NEW YORK GATEWAY
CONNECTIONS IMPROVEMENT PROJECT
TO THE US PEACE BRIDGE PLAZA

Draft Design Report/Environmental Impact Statement

Draft Section 4(f) Evaluation (49 USC 303)

APPENDIX D – NOISE STUDY

PIN 5760.80
City of Buffalo
Erie County, New York

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U.S. Department of Transportation
Federal Highway Administration

New York State
Department of Transportation

Appendix D

Noise Analysis

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List of Abbreviations and Acronyms

dB	decibel
dBA	hourly A-weighted sound level in decibels
E & E	Ecology and Environment, Inc.
EPC	Environmental Performance Criteria
FHWA	Federal Highway Administration
Hz	Hertz
L_{eq}	continuous equivalent sound level
$L_{eq(x)}$	duration of continuous equivalent sound level measured in x hours
mph	miles per hour
NAC	Noise Abatement Criteria
NYSDOT	New York State Department of Transportation
RCNM	Roadway Construction Noise Model
SPL	sound pressure level
TNM	Traffic Noise Model

1 Introduction

The Federal Highway Administration (FHWA), in cooperation with the New York State Department of Transportation (NYSDOT), has prepared this Draft Environmental Impact Statement (DEIS) in accordance with the National Environmental Policy Act (NEPA) for the New York Gateway Connections Improvement Project to the U.S. Peace Bridge Plaza (Project). The Project is located in the city of Buffalo, Erie County, New York. The Project was developed to address concerns centered on the use of local streets by cross-border traffic as it enters/exits the existing U.S. Border Port of Entry/Peace Bridge Plaza (Plaza). For this Project, the FHWA and NYSDOT are the NEPA joint lead agencies and NYSDOT is the SEQRA lead agency.

The DEIS was prepared in accordance with the NYSDOT Project Development Manual, 17 NYCRR (New York Codes, Rules and Regulations) Part 15, and 23 CFR (Code of Federal Regulations) 771. The need, purpose, and objectives of the Project and the alternatives being considered are briefly described below. More detailed discussions concerning the Project, the environmental considerations, and options considered are provided in Chapters 1, 2, 3, 4, and 6 of the DEIS.

A noise study that includes the analysis of traffic noise impacts and abatement measures is required for the Project because it meets the definition of a Type I project under 23 CFR 772.5(h). Type I projects are defined as "A proposed Federal or Federal-Aid highway project for the construction of a highway on new location or the physical alteration of an existing highway which significantly changes either the horizontal or vertical alignment or increases the number of through-traffic lanes." This Project includes the construction of a new ramp from the Plaza to Interstate 190 (I-190) north.

The noise study was conducted following Section 4.4.18 of NYSDOT's *The Environmental Manual* (TEM) (NYSDOT 2010). This appendix details the measuring and modeling methodologies employed to obtain and predict noise levels within the Project's Study Area. Ecology and Environment, Inc. (E & E) obtained and modeled the noise levels, analyzed and evaluated the results, and predicted potential noise impacts that may occur as a result of this Project. In addition, abatement measures to reduce potential noise impacts resulting from the Build Alternative were evaluated.

1.1 Project Location

The Project is located in the West Side neighborhood of the city of Buffalo, Erie County, New York. The Project area is adjacent to Front Park, which was designed by Frederick Law Olmsted as part of a citywide park and parkway system that opened in 1868; the project also includes a small portion of the park (the existing Baird Drive). Major roadways in the Project area include the Niagara Thruway (I-190), Porter Avenue, Baird Drive, Busti Avenue, and the I-190 ramp connections to and from the Plaza.

1.2 Need, Purpose, and Objectives

The primary need for the Project is to address the limited direct access between the Plaza and I-190. Existing direct access is limited and requires regional and international traffic to use the local street system. This limited direct access increases commercial traffic on the local streets, which were originally designed to meet only the needs of local traffic. An additional need was identified to address the structurally deficient Porter Avenue Bridge over I-190.

The purpose of this Project is to reduce the use of local streets by international traffic (autos and trucks) that utilizes the existing Plaza at its current location. The following objectives have been established to support the Project's purpose and need.

- Provide direct access from the Plaza to northbound I-190,
- Redirect through traffic from Front Park,
- Remove Baird Drive, and
- Replace the Porter Avenue Bridge over I-190 and CSX Railroad.

1.3 Project Alternatives

Based on the Project's need, purpose, and objectives, the following alternatives that have been developed for study within the DEIS.

- ***No-Build Alternative.*** The No-Build Alternative assumes no improvements in the Project area other than those planned by others or implemented as part of routine maintenance. Although the No-Build Alternative does not meet the Project's purpose and need, NEPA requires that it be evaluated in the DEIS. The No-Build Alternative also serves as the baseline condition against which the potential benefits and effects of the Build Alternative are evaluated.
- ***Build Alternative.*** The Build Alternative includes the construction of a new ramp (Ramp D) to provide direct access from the Plaza to northbound I-190 and the construction of a new ramp (Ramp PN) from Porter Avenue to the existing I-190 northbound exit ramp (Ramp N/Ramp A) to the Plaza. The combination of these new ramps would allow the removal of Baird Drive from Front Park and conversion of the existing 1.8 acres of roadbed and sidewalk into additional green space. The removal of Baird Drive would permit 4.5

acres of green space located between Busti Avenue and Baird Drive to be reconnected to the greater park area. This alternative would require modifications to the Massachusetts Pumping Station access road, the Shoreline Trail bicycle/pedestrian facility along the waterfront, and four existing ramps in the vicinity of the Plaza, as well as new signage approaching and within the Plaza to better direct vehicles to the appropriate ramps and routes.

Porter Avenue would be modified to include a roundabout or signalized intersection at 4th Street and the location of Ramps PN and Ramp N. Modifications along Porter Avenue also would include removal and replacement of the bridge over I-190 to optimize the traffic flow to the Plaza from I-190 northbound, which would allow for the construction of a new shared-use path along Porter Avenue connecting Front Park to LaSalle Park and the Niagara River waterfront.

The Shoreline Trail (Riverwalk) crossing over the CSX railroad would be relocated along a new alignment north of its existing location due to the construction of the new Ramp D. A new structure would be constructed over I-190 and the CSX railroad, and the realigned Shoreline Trail would turn south along the Black Rock Canal, extending the trail directly along the waterfront before connecting to the existing Shoreline Trail south of its existing underpass beneath I-190.

2 Noise Methodology

2.1 Fundamentals of Noise Analysis

Noise is defined as any unwanted sound. Sound is defined as any pressure variation that the human ear can detect. Humans can detect a wide range of sound pressures, from 20 to 20 million micropascals, but only those air pressure variations occurring within a particular set of frequencies are experienced as sound. Air pressure changes that occur between 20 and 20,000 times a second, stated as units of Hertz (Hz), are registered as sound.

Sound is often measured and described in terms of its overall energy, taking all frequencies into account. However, the human hearing process is not the same at all frequencies. Humans are less sensitive to low frequencies (less than 250 Hz) than mid-frequencies (500 Hz to 1,000 Hz). Humans are most sensitive to frequencies in the 1,000- to 5,000-Hz range. Therefore, noise measurements are often adjusted, or weighted, as a function of frequency to account for human perception and sensitivities. The most common weighting network used is the A-weighted network. This scale was developed to allow sound level meters to simulate the frequency sensitivity of the human hearing mechanism. It uses a filter network that approximates the hearing characteristic. Sound levels measured using this weighting are denoted as decibel-A (dBA). The letter "A" indicates that the sound has been filtered to reduce the strength of very low and very high frequency sounds, much as the human ear does.

Because the human ear can detect such a wide range of sound pressures, sound pressure is converted to sound pressure level (SPL), which is measured in units called decibels (dB). The decibel is a relative measure of the sound pressure with respect to a standardized reference quantity. Decibels on the A-weighted scale are termed dBA. Because the scale is logarithmic, a relative increase of 10 decibels represents a sound pressure that is 10 times higher. However, humans do not perceive a 10-dBA increase as 10 times louder. Instead, they perceive it as twice as loud. Table 2-1 lists some noise levels for typical daily activities and corresponding human responses. The following is typical of human response to relative changes in noise level:

- A 3-dBA change is the threshold of change detectable by the human ear,
- A 5-dBA change is readily noticeable, and
- A 10-dBA change is perceived as a doubling or halving of the noise level.

Table 2-1 Noise Levels of Common Sources and Human Response

Noise Source (Distance from Source)	dBA Noise Level	Response
	150	
Carrier Jet Operation	140	Harmfully Loud
	130	Pain Threshold
Jet Takeoff (200 feet) Discotheque	120	
Unmuffled Motorcycle Auto Horn (3 feet) Rock 'n Roll Band Riveting Machine	110	Maximum Vocal Effort Physical Discomfort
Loud Power Mower Jet Takeoff (2,000 feet) Garbage Truck	100	Very Annoying Hearing Damage (Steady 8-Hour Exposure)
Heavy Truck (50 feet) Pneumatic Drill (50 feet)	90	
Alarm Clock Freight Train (50 feet) Vacuum Cleaner (10 feet)	80	Annoying
Freeway Traffic (50 feet)	70	Telephone Use Difficult
Dishwashers Air Conditioning Unit (20 feet)	60	Intrusive
Light Auto Traffic (100 feet)	50	Quiet
Living Room/Bedroom	40	
Library Soft Whisper (15 feet)	30	Very Quiet
Broadcasting Studio	20	
	10	Just Audible
	0	Threshold of Hearing

Source: Branch and Beland 1970.

The SPL that humans experience typically varies from moment to moment. Therefore, various descriptions are used to evaluate noise levels over time. Some typical descriptors are defined below.

L_{eq} is the continuous equivalent sound level. The sound energy from the fluctuating SPLs is averaged over time to create a single number to describe the mean energy, or intensity, level. The duration of the measurement would be shown as $L_{eq(x)}$; a 24-hour measurement would be shown as $L_{eq(24)}$. The L_{eq} has an advantage over other descriptors because L_{eq} values from various noise sources can be added and subtracted to determine cumulative noise levels.

L_{max} is the highest SPL measured during a given period of time. It is useful in evaluating L_{eq}s for time periods that have an especially wide range of noise levels.

The decrease in sound level due to distance from any single noise source normally follows the "inverse square law." That is, SPL changes in inverse proportion to the square of the distance from the sound source. In a large open area with no obstructive or reflective surfaces, it is a general rule that at distances greater than 15.2 meters (50 feet), the SPL from a point source of noise diminishes at a rate of 6 dB with each doubling of distance away from the source. For "line" sources such as vehicles on a street, the SPL drops off at a rate of 3 dB with each doubling of the distance from the source. Sound energy is absorbed in the air as a function of temperature, humidity, and the frequency of the sound. This attenuation in air can be up to 2 dB over 304.8 meters (1,000 feet). The drop-off rate will also vary with both terrain conditions and the presence of obstructions in the sound propagation path.

The three principal types of noise sources that affect the environment are mobile sources, stationary sources, and construction sources. Mobile sources are those noise sources that move in relation to a noise receiver—principally automobiles, buses, trucks, aircraft, and trains. Stationary sources of noise, as the name implies, do not move relative to a noise receiver. Typical stationary noise sources of concern include machinery or mechanical equipment associated with industrial and manufacturing operations, or building heating, ventilating, and air-conditioning systems. Construction noise sources comprise both mobile sources (e.g., trucks, bulldozers) and stationary sources (e.g., compressors, pile drivers, power tools). Even though the duration of construction activities may be years, it is temporary.

2.2 Measurement Equipment

All measurements were conducted in accordance with FHWA guidelines using a Bruel & Kjaer 2260 Observer Modular Precision Sound Analyzer. The 2260 uses a Type 4189 microphone. The analyzer and microphone were factory calibrated, and calibration was checked before, periodically throughout, and after measurements with a Bruel & Kjaer Model 4231 sound level calibrator.

2.3 Modeling

The Traffic Noise Model (TNM) version 2.5, developed by the FHWA, was used to predict noise levels and assess noise impacts at the identified receiver. The TNM is a state-of-the-art model used to predict noise levels resulting from vehicles traveling on roadways. The method of noise level calculation at each selected receiver involves computation of the noise contributions from a series of roadway segments. The noise due to each segment is characterized by speed-dependent reference noise emission levels and vehicle density by vehicle type. The TNM has the capability of simulating complex geographic settings and calculating noise attenuation resulting from noise barriers. In addition, the TNM can calculate the additional noise generated by vehicles accelerating away from traffic control devices (e.g., traffic signals).

When using the TNM model, it is preferable that the modeling results and the actual measured data be consistent with traffic conditions. In general, the difference between the modeled result and measured data should not exceed 3 dBA. Comparing modeled results and measured results provides a check that the model roadway geometry is properly set up.

Traffic counts were taken at several receiver locations throughout the Study Area while noise measuring was being conducted. These traffic counts were used in the TNM model to compare the measured and modeled results. The differences between measured and modeled results for all receiver are within 3 dBA, which confirms that the model roadway geometry was properly set up.

Existing noise levels and predicted levels for the year 2045 were developed for the No Build Alternative and the Build Alternative using the TNM modeling. The design of the Build Alternative was modeled under two scenarios. The first option, Option A, involves a traditional signalized intersection at Porter Avenue and 4th Street. Under this option, traffic flow is controlled by traffic signals and the traffic generally has to stop and start, depending on the signals. The second option, Option B, replaces the signalized intersection at Porter Avenue and 4th Street with a non-signalized roundabout intersection where traffic flow is not subjected to a predetermined stop and go, but is a more free-flowing process governed by the volume of traffic entering and exiting the roundabout. Both options were modeled because traffic that has to stop and then accelerate from the stop at a signalized intersection generally results in higher noise levels than traffic that continues to move or flow along the same roadway and is not subject to controlled stopping and starting by a traffic signal.

Traffic speed was set at 30 miles per hour (mph) on the ramps; 30 mph on city streets; and 20 mph on the Plaza. Year 2013 traffic data was gathered and analyzed by Parsons Transportation Group. The traffic data used for this analysis are provided in Attachment A**.** The TNM can evaluate five vehicle classes, including automobiles, medium trucks, heavy trucks, buses, and motorcycles. For this Project, buses and motorcycles are a minor component of the cross-border traffic; therefore, buses were included with the medium truck volume and motorcycles were included with automobiles for this evaluation. Three classes of vehicles were used in the TNM modeling: automobiles, medium trucks, and heavy trucks. Receiver height was set at 4.92 feet in all noise models.

2.4 Noise Level Objectives and Criteria

As outlined in 23 CFR 772, the FHWA has established criteria that represent the upper limit of acceptable traffic noise levels in areas based on defined land use. Table 2-2 presents the Noise Abatement Criteria (NAC) in Section 4.4.18 of the TEM (NYSDOT 2010). Abatement must be considered when noise levels exceed or are within 1 decibel of the NAC, or when existing noise levels are exceeded by 6 or more dB. The FHWA guidance indicates that the minimum noise reduction for an abatement measure to be considered feasible is 5 dBA. The TEM requires that the abatement analysis include every reasonable effort to achieve a substantial noise reduction of 10 dBA or more. However, a minimum reduction of 7 dBA at the most benefitted receiver must be achieved.

Table 2-2 Noise Abatement Criteria

Activity Category	$L_{EQ}(H)$[1]	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[2]	67 (Exterior)	Residential
C[2]	67 (Exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, daycare centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	52 (Interior)	Auditoriums, daycare centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E[2]	72 (Exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	--	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	--	Undeveloped lands that are not permitted

Source: FWHA 2011.

Notes:
[1] Hourly A-Weighted Sound Level - decibels (dBA).
[2] Includes undeveloped lands permitted for this activity category.

2.5 Receiver Locations

In accordance with the NYSDOT TEM, receiver such as residences, schools, churches, hospitals, libraries, auditoriums, parks, and preserved natural areas were identified using topographical maps and aerial photographs. A site visit was made that included a driving survey along the local roads within the Study Area. In the vicinity of the Project area, there are no lands for which current development is planned, since all areas are currently developed.

Figure D-1 identifies the locations where the existing measurements were obtained and the 25 representative receiver locations identified for evaluation of noise impacts associated with the Build Alternative.

2.6 Existing Noise Level Measurements

Short-term measurements of existing noise were taken to obtain energy-equivalent hourly sound level data during the hour of the day in which worst-case traffic levels can be expected (evening rush-hour period, 3:00 p.m. to 7:00 p.m.). These measurements of existing noise were obtained at exterior areas of frequent human use at five locations within the Study Area, including residences, parks, and commercial areas (see Figure D-1). The results are summarized in Table 2-3. As indicated in the table, the existing noise levels ranged from 62 to 68 dBA.

Table 2-3 Existing Noise - Measurement Results

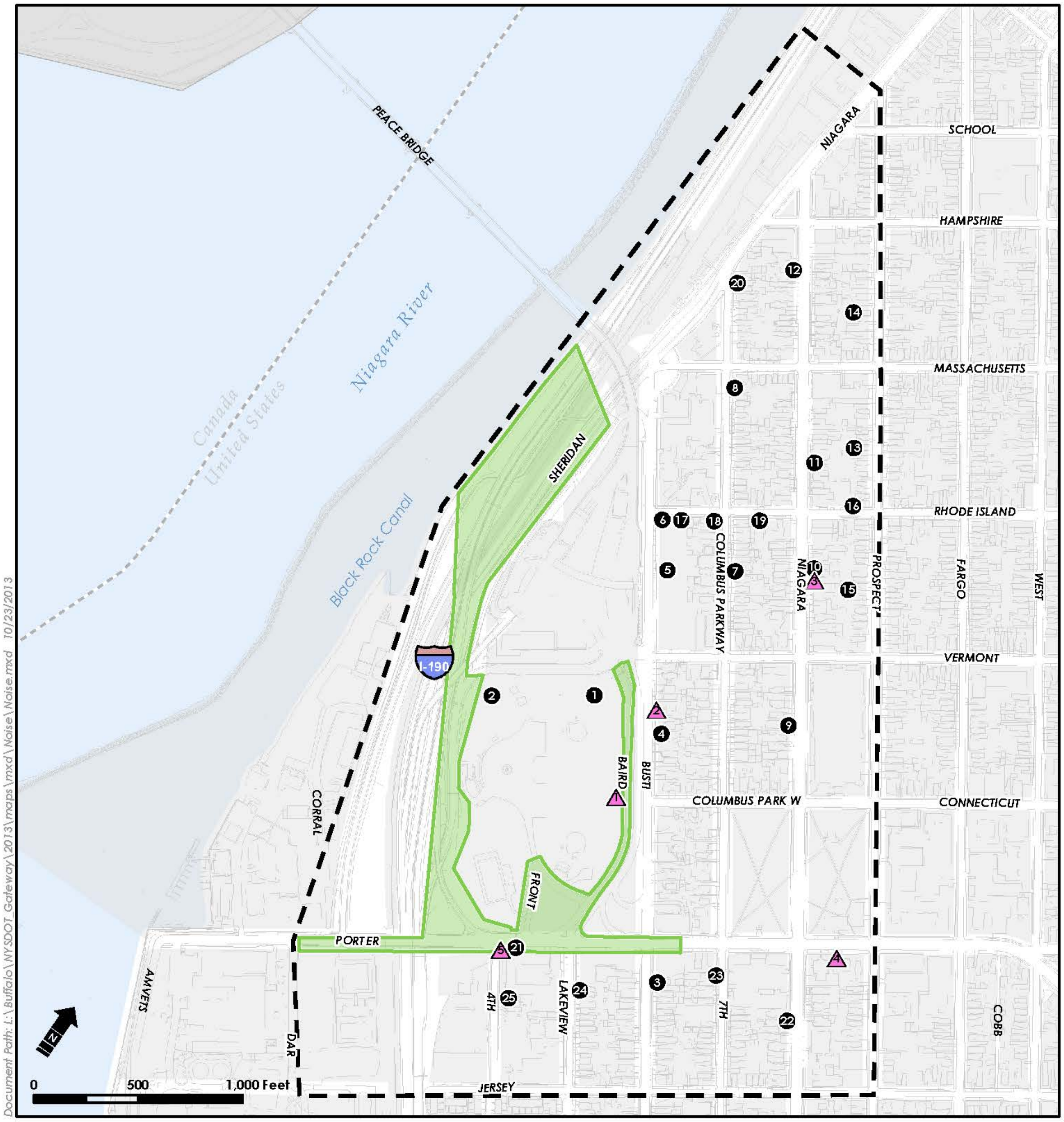
Receiver	Receiver Location	Measured Results (dBA)
1	Baird Drive along Front Park, opposite Columbus Parkway	65
2	707 Busti Avenue	62
3	811 Niagara Street	67
4	291 Porter Avenue	63
5	111 Porter Avenue, Peace Bridge Apartments	68

2.7 Predicted Noise Levels

TNM modeling was used to develop noise levels for the current year and the year 2045 for the No Build Alternative and the Build Alternative (Options A and B). The computer models were developed by overlaying the proposed changes to the local travel pattern on a base map of the area in 'dxf' format. The 'dxf' file was imported into the model as a background, and roadway links were then digitized in the model to mimic street and Plaza ramp traffic patterns. The current P.M. peak-hour traffic data were entered into the model to predict the existing noise levels. The year 2045 peak-hour traffic volumes were used to predict noise levels for the No Build Alternative and Build Alternative (Options A and B).

The predicted noise levels (see Attachment B) for the existing conditions and the year 2045 No Build Alternative and Build Alternative (Options A and B) conditions are summarized below in Table 2-4. This table also identifies the predicted changes in noise level compared to the existing conditions. Shaded areas in the table indicate receiver locations for the Build Alternative (Options A and B) that are predicted to equal or exceed 66 dBA (i.e., 1 dBA less than the NAC of 67 dBA for Activity Categories B and C) and that are predicted to have a noise impact. Figures D-2 and D-3 present the approximate noise level contours predicted for the Study Area under existing conditions and in the year 2045 as a result of the construction of Build Alternative Options A and B.

D-1 Noise Study Area



NY Gateway Connections Project
Figure D-1 Noise Study Area
Erie County, New York

Noise Study Area
Project Area
Noise Measurement Location
Representative Noise Receptor Location

SOURCE Ecology and Environment, Inc.

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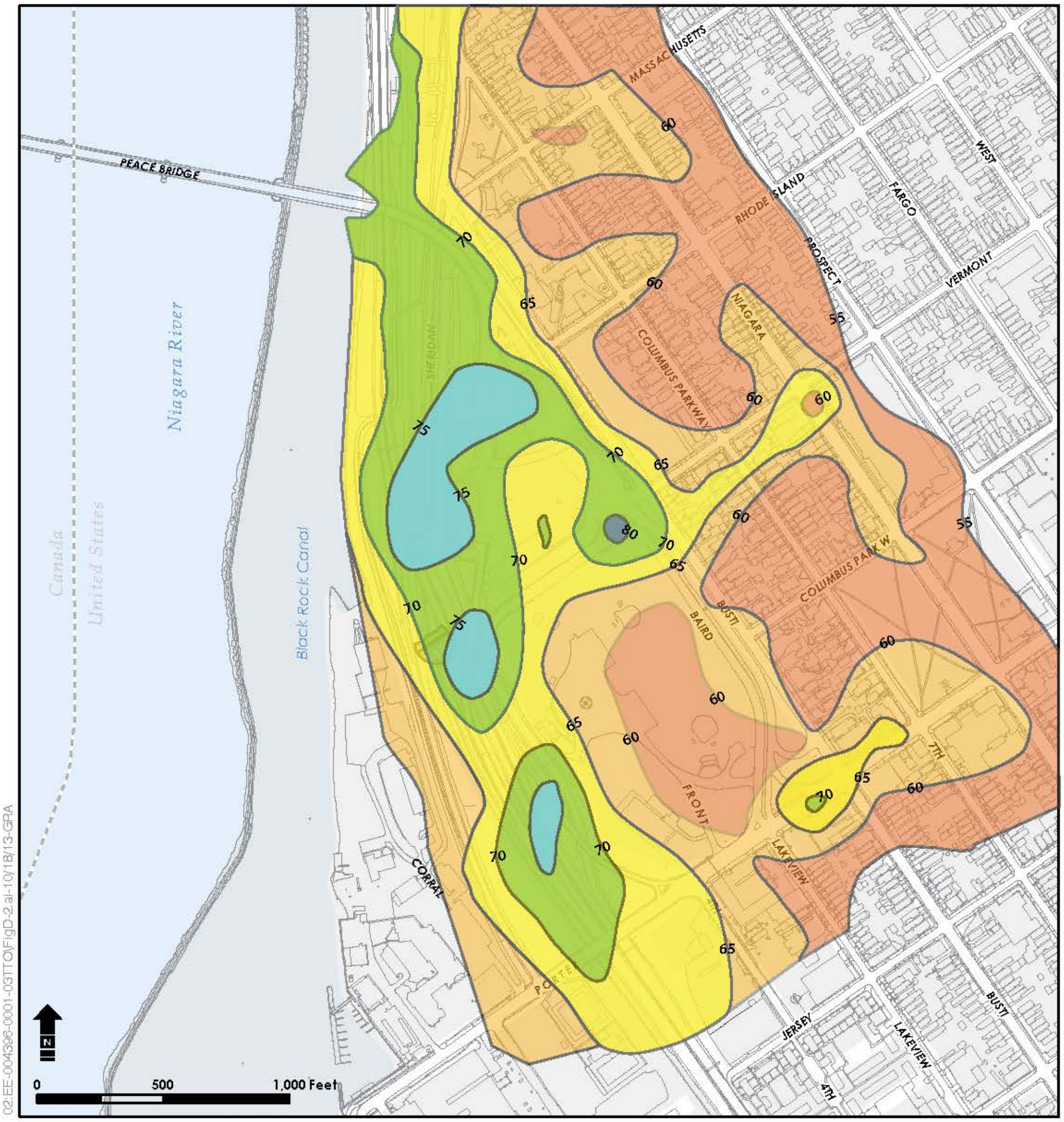
D-2 Existing Noise Contours



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NY Gateway Connections Project
Noise Study Area
Erie County, New York

Existing Noise Contours
Figure D-2

SOURCE Ecology and Environment, Inc.

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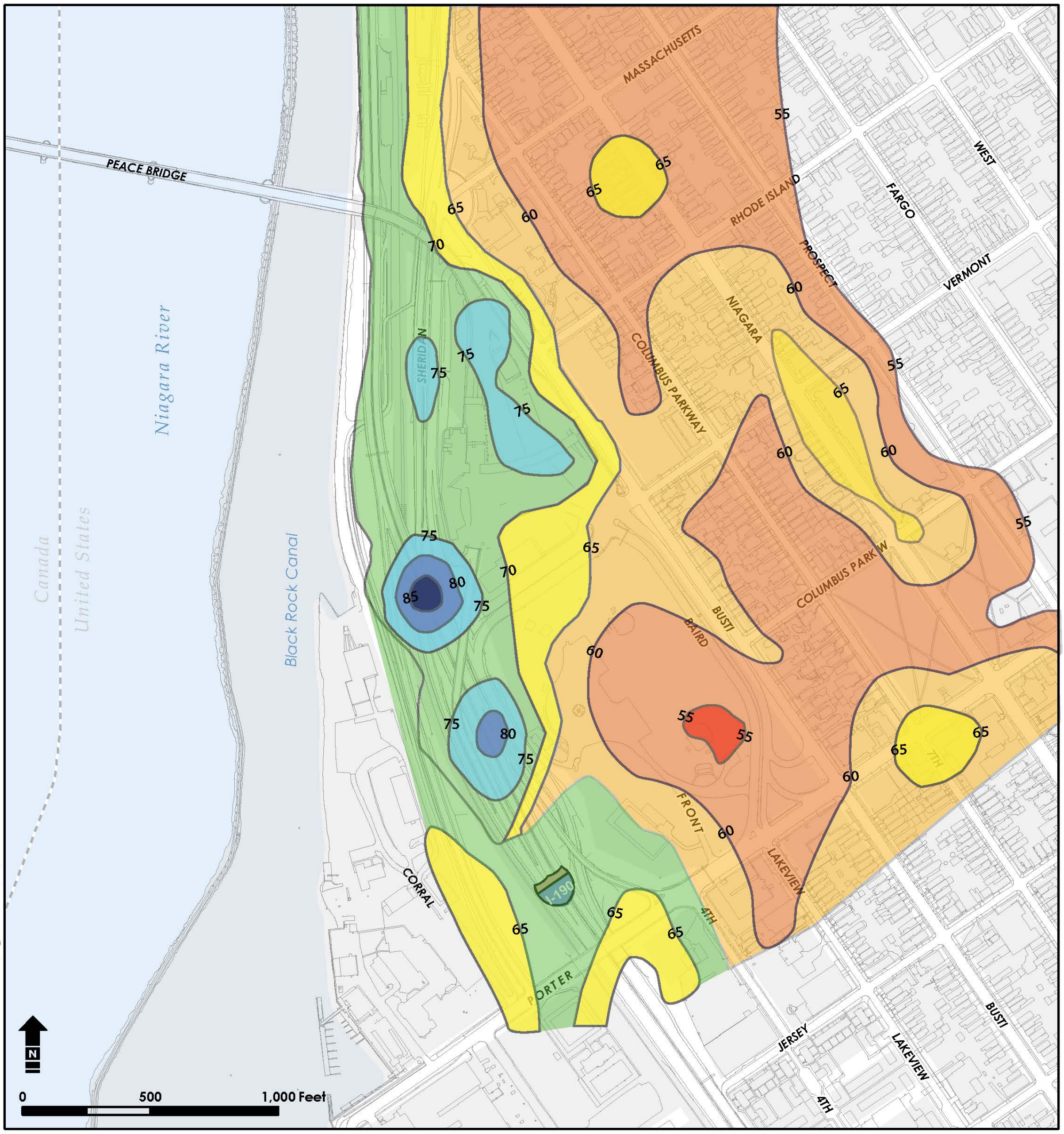
D-3 Noise Contours - Build Alternative - 2045



NY Gateway Connections Project
Noise Study Area
Erie County, New York

Noise Contours-Build Alternative - 2045
Figure D-3

SOURCE Ecology and Environment, Inc.

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Table 2-4 Noise Modeling Results (dBA)

Receiver #	Receiver Location	Existing Noise Levels	No Build Alternative: Year 2045 Noise Levels	No Build Alternative: Difference Between Existing and 2045 Noise Levels	Build Alternative, Option A: Predicted Year 2045 Noise Levels	Build Alternative, Option A: Difference Between Existing and 2045 Noise Levels	Build Alternative, Option B: Predicted Year 2045 Noise Levels	Build Alternative, Option B: Difference Between Existing and 2045 Noise Levels
1	Front Park area - tennis courts	64	66	2	65	1	65	1
2	Front Park Area - Northwest	66	67	1	68	2	68	2
3	573 Busti Avenue	60	60	0	61	1	61	1
4	696 Busti Avenue	62	63	1	63	1	63	1
5	783 Busti Avenue	58	59	1	59	1	59	1
6	796 Busti Avenue	59	60	1	61	2	61	2
7	854 Columbus Parkway	57	58	1	58	1	58	1
8	870 Columbus Parkway	60	61	1	62	2	62	2
9	744 Niagara Street	65	65	0	66	1	66	1
10	817 Niagara Street	65	66	1	66	1	66	1
11	867 Niagara Street	65	66	1	66	1	66	1
12	930 Niagara Street	63	64	1	64	1	64	1
13	Backyard – Prospect Avenue between Massachusetts Avenue and Rhode Island Street	55	56	1	56	1	56	1
14	Backyard – Prospect Avenue between Massachusetts Avenue and Hampshire Avenue	55	56	1	56	1	56	1
15	Backyard – Prospect Avenue between Rhode Island Street and Vermont Street	56	56	0	56	0	56	1
16	89 Massachusetts Avenue	58	59	1	59	1	59	1
17	27 Rhode Island Street	59	60	1	60	1	60	1
18	30 Rhode Island Street	59	60	1	60	1	60	1
19	54 Rhode Island Street	60	61	1	61	1	61	1
20	915 7th Street	63	64	1	64	1	64	1

Table 2-4 Noise Modeling Results (dBA)

Receiver #	Receiver Location	Existing Noise Levels	No Build Alternative: Year 2045 Noise Levels	No Build Alternative: Difference Between Existing and 2045 Noise Levels	Build Alternative, Option A: Predicted Year 2045 Noise Levels	Build Alternative, Option A: Difference Between Existing and 2045 Noise Levels	Build Alternative, Option B: Predicted Year 2045 Noise Levels	Build Alternative, Option B: Difference Between Existing and 2045 Noise Levels
21	111 Porter Avenue – Peace Bridge Apartments	68	69	1	69	1	69	1
22	620 Niagara Street	65	66	1	66	1	66	1
23	586 7th Street	60	60	0	59	-1	59	-1
24	122 Lakeview Avenue	59	61	2	58	-1	58	-1
25	621 4th Street	63	63	0	60	-3	60	-3

3 Noise Impacts

The FHWA and NYSDOT have established two criteria to determine whether a traffic noise impact exists:

- The predicted noise level at the exterior approaches, equals, or exceeds the NAC listed in Table 2-2. The NYSDOT has defined “approach” to be 1 decibel less than the NAC. Thus, an impact will occur when the predicted future noise level is 66 dBA or greater for Activity Category B.
- The predicted traffic noise level substantially exceeds the existing noise levels. The NYSDOT has defined “substantially” as an increase of 6 dBA or more.

According to FWHA and NYSDOT guidance, when determining and abating traffic noise impacts, primary consideration is to be given to exterior areas. In most situations, if the exterior area can be benefited, the interior also will be benefited.

3.1 No Build Alternative

The modeled existing noise for the current design year ranged from 55 to 68 dBA. For the No Build Alternative, the predicted noise levels for the year 2045 would rise to between 56 and 69 dBA. The predicted increase in noise levels between 2013 and 2045 for the receiver range from 0 dBA to 2 dBA. A change of 3 dBA is the threshold of change in noise levels normally detectable by the human ear. These increases in noise levels are directly related to a predicted increase in traffic volumes throughout the Study Area between the years 2013 and 2045.

The No Build Alternative would result in one generally residential area along Niagara Street (approximately 47 dwellings mixed with some commercial receiver), an apartment building in a commercial area on Porter Avenue, and a portion of Front Park experiencing noise levels that equal or exceed 66 dBA. These areas are described below.

Niagara Street from Hampshire Street to Jersey Street

This zone includes representative receiver 9, 10, 11, 12, and 22. This is a mainly residential area on both sides of the street, with some commercial activities also present. Eighty-one dwellings are located in this zone. The existing noise levels for these five receiver locations range from 63 to 65 dBA, and noise levels along this section of Niagara Street are predicted to rise to 64 to 66 dBA in 2045. In

2045, the noise level would rise to 66 dBA at an estimated 47 residences in this zone (receiver 10, 11, and 22).

Porter Avenue from I-I90 to Niagara Street

This zone includes receiver 21, the Peace Bridge Apartments, which have indoor residential living space but no designated outdoor areas where residents might be expected to spend time. The existing noise level at this receiver is 68 dBA. Year 2045 noise levels along this section of Porter Avenue are predicted to rise to 69 dBA.

Front Park

This zone includes receiver 1 and 2, which are located within Front Park. The existing noise levels at these sites are 64 and 69 dBA, respectively. In 2045, these noise levels are predicted to rise to 66 and 70 dBA, respectively. Noise abatement measures were evaluated for this location. The expected traffic along the I-190 and on the northbound exit ramp from the I-190 (Ramp A) to the Plaza is responsible for the predicted increase in noise level at these receivers.

3.2 Build Alternative, Option A

The Build Alternative, Option A, would result in changes in traffic patterns entering and exiting the Plaza and increased traffic volumes on specific sections of local city streets such as Niagara Street between Massachusetts Avenue and Porter Avenue. The TNM model-predicted noise levels under Option A range from 56 to 69 dBA. Six of the receiver locations would experience noise levels equal to or in excess of 66 dBA by the year 2045, which constitutes a traffic noise impact per federal regulation and NYSDOT Noise Policy. These increases are tied to the changes in the traffic patterns of vehicles entering the Plaza via Ramp PN and exiting the Plaza via Ramp C to access the local street network, particularly Niagara Street south. Two of the six receiver locations (Nos. 2 and 21) have existing noise levels of 66 and 68 dBA, respectively. The TNM model predicts that noise receiver location No. 2 would experience a rise of 2 dBA by the year 2045, whereas noise receiver location No. 21 would experience a rise of 1 dBA over the same time period. The predicted rise in noise level at these two locations is similar to the noise level increases predicted under the No Build Alternative. The predicted increase in noise level is less than what is normally perceivable by humans (3 dBA or greater).

Four receiver locations along Niagara Street (Nos. 9, 10, 11, and 22) would experience a rise in noise level from 65 to 66 dBA under the Build Alternative, Option A, which constitutes a traffic noise impact. The increase in noise level is attributed to the rise in traffic volume and the change in the traffic pattern of vehicles exiting the Plaza via Ramp C to Niagara Street south. The Build Alternative, Option A, is predicted to add an estimated 40 vehicles per hour to this section of Niagara Street during the afternoon peak traffic period (see Appendix B – Traffic Analysis). The increase in noise level is less than what is normally perceivable by humans (3 dBA or greater).

The Build Alternative, Option A, would lead to a reduction in noise levels of up to 3 dBA below the existing level at three receiver (Nos. 23, 24, and 25). These receivers are located in the residential area immediately south of Porter Avenue. The noise reduction would result from changes in traffic pattern and volume along Porter Avenue.

Niagara Street from Massachusetts Avenue to Jersey Street

This zone includes receiver 9, 10, 11, 12, and 22. Since the year 2045 noise levels along this section of Niagara Street would rise to 66 dBA, which constitutes a noise impact, noise abatement measures were evaluated for this section.

Porter Avenue from I-190 to Niagara Street

This zone includes receiver 21, the Peace Bridge Apartments. The year 2045 noise levels at this receiver are predicted to rise to 69 dBA, which constitutes a noise impact. This is an increase of 1dBA greater than the existing noise level at this location. Noise abatement measures were evaluated for this section.

Front Park

This zone includes receiver 1 and 2. The year 2045 noise level at receiver 1 in Front Park is predicted to be 65 dBA, an increase of 1 dBA above the current noise level. The year 2045 noise level in the northwest corner of Front Park, receiver 2, is predicted to be 68 dBA, which constitutes a noise impact. This is an increase of 2 dBA above the existing noise level. Noise abatement measures were evaluated for the park.

3.3 Build Alternative, Option B

Option B would result in the same changes in traffic patterns entering and exiting the border crossing as Option A, as well as the same increased traffic volumes on specific local city streets such as Niagara Street and Porter Avenue. Although the Porter Avenue intersection design differed between options A and B, the modeling results were the same.

3.4 Construction Noise

The Build Alternative, regardless of which Porter Avenue option is selected, would result in short-term construction noise impacts on the nearby residences and park area. The levels of impact will vary widely, depending on the construction activities undertaken and the anticipated duration of the construction period. The parameters that determine the nature and magnitude of construction noise impacts include the type, age, and condition of construction equipment; operation cycles; the number of pieces of construction equipment being run simultaneously; the distance between the construction activities and receivers; and the location of haul routes with respect to receivers. Many of these parameters will not be defined until final design plans and specifications have been prepared.

Typical noise levels associated with construction equipment range from 77 dBA for a dump truck to 101 dBA for a pile driver at a distance of 50 feet from the source.

To evaluate potential noise impacts as a result of the construction of the Build Alternative, the Roadway Construction Noise Model (RCNM) developed by the FHWA was employed. The baseline noise levels for the selected receivers close to the construction area were entered into the RCNM along with the approximate distance from the center of the construction area to the receivers. The construction equipment, utilization percentage, and expected maximum sound level (L_{max}) values listed in **Table 3-1** were selected within the model. **Table 3-2** presents the resulting noise levels for the selected receivers.

Table 3-1 Construction Equipment

Equipment Description	Usage (%)	L_{max} (dBA)
Auger Drill Rig	20	84
Backhoe	40	78
Dozer	40	82
Compactor (ground)	20	83
Concrete Mixer Truck	40	79
Crane	16	81
Dump Truck	40	77
Generator	50	81
Grader	40	85
Jackhammer	20	89
Paver	50	77
Pile Driver	20	101
Rock Drill	20	81

Table 3-2 Construction Noise Levels

Receiver	Calculated (dBA)	
	L_{max}	L_{eq}
Removal of Baird Drive		
Front Park NE	71	70
Front Park NW	65	64
Front Park Center	73	72
696 Busti Avenue	74	73
783 Busti Avenue	62	61
612 Busti Avenue	67	66
111 Porter Avenue	62	61
Northbound I-190 Ramp Construction		
Front Park NE	80	74
Front Park NW	84	78
Front Park Center	78	72
696 Busti Avenue	75	69
783 Busti Avenue	76	70
612 Busti Avenue	71	65
111 Porter Avenue	71	65

The Build Alternative, regardless of which Porter Avenue option is selected, would result in short-term construction noise annoyance during the construction period when activities are at peak levels and/or nearest to receivers; however, based on the model results, no severe impacts are expected.

Abatement of temporary construction noise typically includes measures to control noise at the source, control noise at the site, and/or increase community awareness of the construction activities. Construction noise abatement measures that will be applied when feasible and practical include, but are not limited to, the following:

- Provide temporary noise barriers;
- Provide partial enclosures for stationary equipment such as compressors;
- Keep the public informed of upcoming operations;
- Provide a compliant and resolution mechanism;
- Configure operations to minimize use of backup alarms;
- Use ambient sensitive backup alarms;
- Limit work to daylight hours; and Limit “tailgate banging.”

4 Noise Abatement Measures

According to the NYSDOT TEM (NYSDOT 2010), noise abatement measures must be physically feasible; provide a recognizable noise reduction; be cost-effective; and the benefited property owners and residents must concur with the recommended measures in order for them to be implemented. In areas where some form of abatement is feasible, a 10- dBA reduction in the noise level is desirable, while a 7-dBA reduction is considered a minimum. The Federal-Aid Program Guide (23 CFR 772.13) requires consideration of the following noise abatement measures:

- Traffic management measures such as traffic control devices, signing for prohibition of certain vehicle types, time-use restrictions for certain vehicles, and modified speed limits;
- Alteration of horizontal and vertical alignments;
- Construction of noise barriers within the highway right-of-way;
- Noise insulation for public use or nonprofit institutional structures; and
- Acquisition of real property to serve as a buffer zone.

All of the above measures were considered for this Project and are discussed below.

4.1 Traffic Management Measures

4.1.1 Lower Speed Limits

Speed restrictions are not a feasible choice because many of the roads associated with the Project are on/off ramps of I-190 and a reduction of the speeds in these zones would be unsafe. In addition, posted speeds on I-190 (55 mph) and the surrounding local roadway system (30 mph) are within established guidelines for these types of roads, and lowering them is not considered to be a practical solution.

4.1.2 Traffic Control Devices

The use of signal coordination at selected intersections to reduce the amount of stop-and-go traffic was reviewed and discussed within the Traffic Analysis (see Appendix B). Stop-and-go traffic usually produces higher noise levels than traffic that maintains a constant speed. Recommendations for improving the flow of traffic traveling through the Study Area are included in Appendix B. Signal coordination could help to reduce noise levels related to the stopping and starting of vehicles at intersections. However, noise levels are related to the overall movement of vehicles throughout the Study Area. Coordination of signals, while recommended for enhancing traffic flow, would not provide substantial overall noise reduction.

4.1.3 Noise Barriers

The use of noise barriers was studied as a means to reduce noise levels at the specific locations described in the previous chapter. To be effective, a noise barrier must be continuous along the length of the roadway in order to block the line of sight from receivers to the noise source. Breaks in a noise barrier caused by driveways and/or cross-streets would render the barrier ineffective. Given the densely developed, urban nature of the Study Area, the need for frequent breaks in the barrier to accommodate both local traffic patterns and access to and from properties would render this method of mitigation ineffective.

Front Park

The park would benefit from the closing of Baird Drive and the relocation of the entrance to the Plaza from Porter Avenue further to the west to tie into the ramp from the I-190 northbound. Receiver locations in the park that border I-190 and the Plaza access ramp would still be considered impacted. Construction of a noise barrier would not be feasible along the west boundary of the park because the park is situated at a much higher elevation than the I-190 and the entrance ramp to the Plaza, making a barrier placed at the right-of-way line ineffective. Construction of a noise barrier also would impact the character and historic nature of the park and its setting by impeding the view of the Niagara River and Lake Erie from within the park. Installation of a noise barrier at this location is not a practical solution.

4.2 Noise Insulation for Public Schools

No public schools would be impacted by this Project.

4.3 Buffer Zones

According to FHWA and NYSDOT guidance, buffer zones are undeveloped, open spaces that border a highway. Buffer zones are created when a highway agency purchases land or development rights, in addition to the normal right-of-way, so that future dwellings cannot be constructed close to the highway. This prevents the possibility of constructing dwellings that would otherwise have an excessive noise level from nearby highway traffic. The acquisition of additional property to serve as a buffer zone would not be a practical or cost-effective method of noise abatement for this Project since the Project Area is located in a densely developed urban area.

5 Conclusion

As indicated in Table 5-1, for the Build Alternative, Options A and B, the noise level would be within 1 decibel of the NAC of 67 dBA in three general areas and impact 36 residences. The No Build Alternative would result in noise levels that would be within 1 dBA of the NAC at 38 residences in these three areas as detailed in Appendix B.

Table 5-1 Build Alternative, Options A and B, Noise Impact Areas

Alternative/Zone	Land Use	Predicted Noise Level (dBA)
Niagara Street from Jersey Street to Hampshire Street	Residential (52)	61 – 68
Porter Avenue	Commercial	69
Front Park	Park	68

For all impacted properties, traffic control measures and barriers were evaluated and found to be either infeasible or unreasonable. Furthermore, the creation of additional buffer zones would not be practical or cost effective.

As required by 23 CFR 772.15, information concerning local noise impacts resulting from a proposed project must be presented to local officials. The regulation states: "In an effort to prevent future traffic noise impacts on currently undeveloped lands, highway agencies shall inform local officials within whose jurisdiction the highway project is located of the following:

(a) The best estimation of future noise levels (at various distances from the highway improvement) for either developed and undeveloped lands or properties in the immediate vicinity of the project,

(b) Information that may be useful to local communities to protect future land development from becoming incompatible with anticipated highway noise levels, and

(c) Eligibility for Federal-aid participation for Type II projects as described in § 772.13(b) of this chapter."

5 Conclusion

The information in this appendix provides local government officials with the required information to make the appropriate decisions necessary to prevent future traffic noise impacts.

6 References

Federal Highway Administration (FHWA). 1995. *Highway Traffic Noise Analysis and Abatement Policy and Guidance*.

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New York State Department of Transportation (NYSDOT). 2010. *The Environmental Manual*, Section 4.4.18, Noise Analysis Policy and Procedures.

A Traffic Data

Provided on disk.

B TNM Sound Level Results

Provided on disk.